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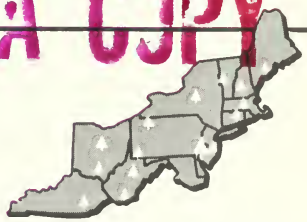

FOREST SERVICE, U.S. DEPT. OF AGRICULTURE, 6816 MARKET STREET, UPPER DARBY, PA. 19082

ODC 181.63:242:176.1 *Liriodendron tulipifera* L.

CHANGES IN TREE DENSITY DO NOT INFLUENCE EPICORMIC BRANCHING OF YELLOW-POPLAR

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Abstract.—Epicormic branching was studied in a West Virginia yellow-poplar stand thinned to various tree density levels. Study trees in the 55- to 60-year-old second-growth stand were primarily codominant in crown class with 32 to 48 feet of log height. Eight-year study results indicated that yellow-poplar trees in this age class and locale could be thinned without serious loss of log quality from epicormic branching.

Epicormic branches often develop on the main boles of many Appalachian hardwood trees. As these epicormic branches develop, knots form and the wood is discolored. Log quality is reduced.

The origin and development of the epicormic branches are well documented *(Kormanik and Brown 1969)*. Several factors are known to stimulate epicormic branching; exposure of the tree bole to light being cited most frequently. Species differ in their production of epicormic branches; the oaks (*Quercus* sp.) and black cherry (*Prunus serotina* Ehrh.) characteristically produce more branches than do white ash (*Fraxinus americana* L.) or yellow-poplar (*Liriodendron tulipifera* L.) *(Smith 1966)*.

Certain hardwood species can be thinned to a residual basal area of about 80 square feet per acre without stimulating epicormic branching *(Hedlund 1964, Huppuch 1961)*. Della-Bianca *(1972)* thinned 30- to 76-year-old yellow-poplars in the southern Appalachians to about 40 square feet of residual basal area per acre with no significant increase in the number of epicormic branches.

This paper reports the results of an 8-year West Virginia study in which yellow-poplar trees were thinned to various density levels.

METHODS

This study was made in a second-growth yellow-poplar stand on the Fernow Experimental Forest near Parsons, West Virginia, growing on an excellent site. The stand was between 55 and 60 years old when thinned.

Data from 631 study trees having 32 to 48 feet of bole height were used in the analyses. The trees ranged in size from 6 to 20 inches in

diameter at breast height (dbh), averaging 13 inches dbh, and the sampling was confined largely to codominant trees. Densities were measured around each sample tree with a Spiegel relascope,[1] using 10 and 40 factors. The stand was thinned so that residual basal areas around the study trees ranged from 0 to 160 square feet per acre. We used the density around each tree as the treatment effect because density is correlated with the amount of light that reaches the tree bole.

The following measurements were recorded for each sample tree before or immediately after thinning: dbh; crown dominance class; and density around the tree. The number of epicormic branches was recorded before cutting and at each remeasurement period. Trees were reexamined 2, 5, and 8 years after treatment. Epicormic branches were recorded by 8-foot sections, numbered 1 to 6, with section No. 1 located at the base of the tree and section No. 6 as the half-log between 40 and 48 feet.

Analyses.—The data were analyzed by multivariant regression with 60 dependent variables and 17 independent variables, a technique chosen because the various measurements of the number of epicormic branches on each tree are likely to be correlated. The independent variables were measures of dbh, crown class, and density around the tree. Data were analyzed for 4-section (32-foot), 5-section (40-foot), and 6-section (48-foot) trees.

[1] The use of trade names is for the information and convenience of the reader and does not imply endorsement or approval by the Department of Agriculture or the Forest Service of any product to the exclusion of others that may be suitable.

RESULTS

Number of Epicormic Branches

Effect of thinning (density).—The analysis revealed no relationship between the number of epicormic branches and the degree of thinning. Results for the 2-, 5-, and 8-year periods showed that thinning of any intensity did not increase epicormic branching. A trend toward more epicormic branches at greater heights had been apparent before thinning and was evident after thinning.

The average number of branches for the 40-factor density class is presented in table 1. The increase in number of branches was small, averaging one branch per tree or less, regardless of density class.

Effect of crown class.—Data on epicormic branches are summarized by crown class for each tree in table 1. The average increase in number of epicormic branches was small, 1.0 or

Table 1.—*Average number of epicormic branches per tree before and 2, 5, and 8 years after thinning (40 factor)*

Time period	Thinning density class				Crown class			
	0-40	41-80	81-120	120+	Dominant	Codominant	Intermediate	Overtopped
					4-SECTION TREES			
Before	0.9	0.8	0.7	0.7	0	0.6	0.8	0.9
2-year	1.5	1.1	1.0	.9	0	.3	.1	.1
5-year	1.4	1.0	.8	.7	1.0	.9	1.1	1.3
8-year	.9	.7	.7	.5	1.0	.6	1.0	1.0
					5-SECTION TREES			
Before	0.8	0.5	0.7	0.8	0.9	0.7	0.7	1.7
2-year	1.3	.8	1.0	1.0	.2	.4	.3	.2
5-year	1.3	.7	.9	1.0	.9	1.0	.9	1.2
8-year	1.0	.6	.8	.8	.7	.9	.9	1.1
					6-SECTION TREES			
Before	0.4	0.3	0.4	0.4	0.3	0.3	0.6	0.9
2-year	.8	.7	.7	.7	.5	.7	1.0	1.1
5-year	.7	.9	.7	.7	.5	.7	1.1	.8
8-year	.6	.7	.6	.5	.4	.6	.9	.8

less, regardless of crown class. There was a significant increase in epicormic branching for the top section of all six-section trees. However, this significant increase in the number of branches averaged 0.5 branch or less per tree and was not important in reducing upper log quality. No differences were found when the data were combined on a per-tree basis (table 1).

CONCLUSIONS

Thinning 55- to 60-year-old second-growth yellow-poplar in the central Appalachians to various densities did not produce significant increases in epicormic branching. These results agree with those of Huppuch *(1961)* and Della-Bianca *(1972)*.

Sawlog size yellow-poplar stands can be thinned without serious risk of reducing log quality by encouraging epicormic branching.

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